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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/538,525	06/10/2005	Geoffrey Harding	PHNL031185US	3670

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EXAMINER

ARTMAN, THOMAS R

ART UNIT	PAPER NUMBER
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2882

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/19/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/538,525

Applicant(s)

HARDING, GEOFFREY

Examiner

Thomas R. Artman

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 June 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 June 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 6/10/2005.

- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 2, 7, 8, 10 and 11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. See MPEP § 2173.05(c). Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by "such as" and then narrow language. The Board stated that this can render a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131 USPQ 74 (Bd. App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*, 86 USPQ 481 (Bd. App. 1949).

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Claim 2 recites the broad recitation “an atomic number less than 10”, and the claim also recites “in the range from 4 to 6” which is the narrower statement of the range/limitation.

Claim 7 recites the broad recitation “a low atomic number material”, and the claim also recites “in particular, having a mean atomic number of less than 10” which is the narrower statement of the range/limitation.

Claim 8 recites the broad recitation “a thickness of less than 5”, and the claim also recites “preferably between 1 and 3” which is the narrower statement of the range/limitation.

Claim 10 recites the broad recitation “an angular range from substantially 45 to 135 [degrees]”, and the claim also recites “in particular, 70 to 110 [degrees]” which is the narrower statement of the range/limitation.

Claim 11 recites the broad recitation “in a direction substantially antiparallel to the direction of incidence of said electrons”, and the claim also recites “in particular, in a direction at an angle in the range from 150 to 210 [degrees]” which is the narrower statement of the range/limitation.

The above claims shall be examined upon the merits of the broader ranges recited.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 3-9 and 11-18 are rejected under 35 U.S.C. 102(b) as being anticipated by Arndt (US 6,282,263 B1).

Regarding claims 1, 14 and 15, Arndt discloses an X-ray source (Figs.1 and 2), including:

- a) an electron source 3 for the emission of electrons, and
- b) a target 4 for the mission of characteristic, substantially monochromatic X-rays in response to the incidence of the electrons, where the target is a metal foil less than 10 μm (col.6, lines 13-14), and
- c) a base arrangement for carrying the metal foil, where the metal foil has a high atomic number (copper) allowing the generation of X-rays and the material substantially included in the base arrangement has a low atomic number (carbon) not allowing the generation of X-rays (col.6, lines 5-18), the source further having
- d) an outcoupling means 6 for outcoupling the X-rays on the side of the metal foil on which the electrons are incident and which is opposite to the side of the base arrangement (Fig.2).

With respect to claims 3-5, 16 and 17, Arndt further discloses that the base arrangement has a cooling circuit (items 15-17) arranged to allow water (having a mean atomic number less than 10) to flow along the side of the metal foil opposite to the side on which the electrons are incident (Fig.2; col.4, lines 31-34 and 37-38).

With respect to claims 6 and 18, Arndt further discloses that the cooling circuit has a constriction in the area of the metal foil (at outlet of tube 15 and the back of the target 4, Fig.2).

With respect to claim 7, Arndt further discloses that the target carrier has a low atomic number material having a mean atomic number less than 10 (carbon) on the side facing the coolant (col.6, lines 5-18).

With respect to claim 8, Arndt further discloses that the metal foil has a thickness of less than 5 μm .

With respect to claim 9, Arndt further discloses that the metal of the foil has an atomic number between 40 and 80 (col.4, lines 25-28).

With respect to claim 11, Arndt further discloses that the outcoupling means is adapted to outcouple X-rays in a direction substantially antiparallel to the direction of incidence of the electrons (Fig.2).

With respect to claim 12, Arndt further discloses that the electrons are directed onto the surface of the metal foil at a substantially 90 degree angle (Fig.2).

With respect to claim 13, Arndt further discloses that the electron source is located outside the X-ray beam (Fig.2) to be outcoupled, and the X-ray source has means for directing the electron beam onto the metal foil (col.3, lines 51-58).

Claim 15 is rejected under 35 U.S.C. 102(b) as being anticipated by Day (US 6,078,644).

Day discloses an X-ray source, including an electron source for the emission of electrons, and a target (Fig.1; col.2, lines 54-61) for the emission of substantially monochromatic X-rays in response to the incidence of the electrons, including a metal foil 40 and base arrangement 10, where the metal foil allows for the generation of X-rays and the base member does not.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3, 6 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Whitaker (US 4,622,687) in view of Arndt.

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Regarding claim 1, Whitaker discloses an X-ray source (Figs. 1, 3 and 15), including:

- a) an electron source 153 for the emission of electrons,
- b) a target 20 for the emission of characteristic, substantially monochromatic X-rays in response to the incidence of the electrons, the target being made of a metal foil 149, 151 having a high atomic number allowing the generation of X-rays 145, and
- c) an outcoupling means (not shown) for outcoupling the X-rays on the side of the metal foil on which the electrons are incident and which is opposite to the side of the base arrangement (fig. 15).

Whitaker does not specifically disclose that the metal foil has a thickness of 10 μm or less, and further that the target has a base arrangement being made of a material having a low atomic number such that X-rays are not generated from the base arrangement.

Arndt specifically teaches the practice of forming a target 4 as a metal foil upon a base arrangement made of carbon (col.6, lines 5-18), where the metal foil is less than 10 μm thick. In this way, the target is more efficiently cooled in order to operate the X-ray source for longer periods of time and/or at higher energies, as needed (col.6, lines 14-18).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Whitaker to add a base arrangement of carbon and make the metal foil 10 μm or less, as taught by Arndt, in order to greatly increase the cooling efficiency of the target.

With respect to claim 2, the Whitaker/Arndt prior art combination further discloses that the base arrangement is rotatable and includes carbon, a material having an atomic number less than 10.

With respect to claim 3, Whitaker further discloses that the base arrangement has a cooling circuit (Figs.3 and 15) to allow a coolant to flow along the side 43 of the metal foil opposite to the side on which the electrons are incident.

With respect to claim 6, Whitaker further discloses a constriction in the cooling circuit in the area 43 of the metal foil (Fig.3).

With respect to claim 10, Whitaker further discloses that the outcoupling means is adapted to outcouple X-rays at an angular range from substantially 45 to 135 degrees (Fig.15).

Conclusion

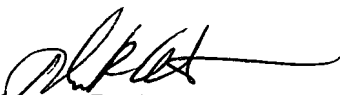
The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Larson (US 5,602,899) teaches a similar structure to that of Arndt, where the metal foil is approximately 4 μm . Yoshihara (US 4,238,706) and Kussel (US 4,130,772 and US 4,130,773) teach cooled rotating anodes. Armini (US 4,477,921) teaches a cooled, multi-layered X-ray target.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thomas R. Artman whose telephone number is (571) 272-2485. The examiner can normally be reached on 9am - 5:30pm Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Thomas R. Artman
Patent Examiner